

LS ELECTRIC

LS XGB EtherCAT® PLC

CPU Module (with embedded I/O)

- XEM-DR14H2
- XEM-DN16H2
- XEM-DP16H2
- XEM-DN32H2
- XEM-DN32HP
- XEM-DP32H2
- XEM-DP32HP

The XEM CPU module from LS Electric is the anchor of the XGB PLC series. It is a high performance motion-capable PLC in a small package. The CPU module is equipped with a high performance microprocessor that controls up to 6 axis of position control, high speed I/O, and built in ethernet communications. Optional EtherCAT® motion modules allow control of up to 16 EtherCAT® servo drives.

The XEM CPU is a stand-alone block style PLC. Different CPU models provide options for low density 16-point I/O wired directly at the CPU terminal blocks, or high density 32-point I/O which requires one smart link cable and terminal block remotely mounted. The system supports 16 built-in PID loops and can be expanded with up to 7 modules.

I/O and memory are assigned direct variables. User-defined symbolic variables can be created for easy reference in the programming.

The PLC offers an advanced level of programming, featuring the IEC61131-3 standard capable of Ladder, Structured Text, Sequential Function Chart and Instruction List. Many advanced Function block instructions, including motion specific ones, are available for use in both Ladder and Structured Text programming.



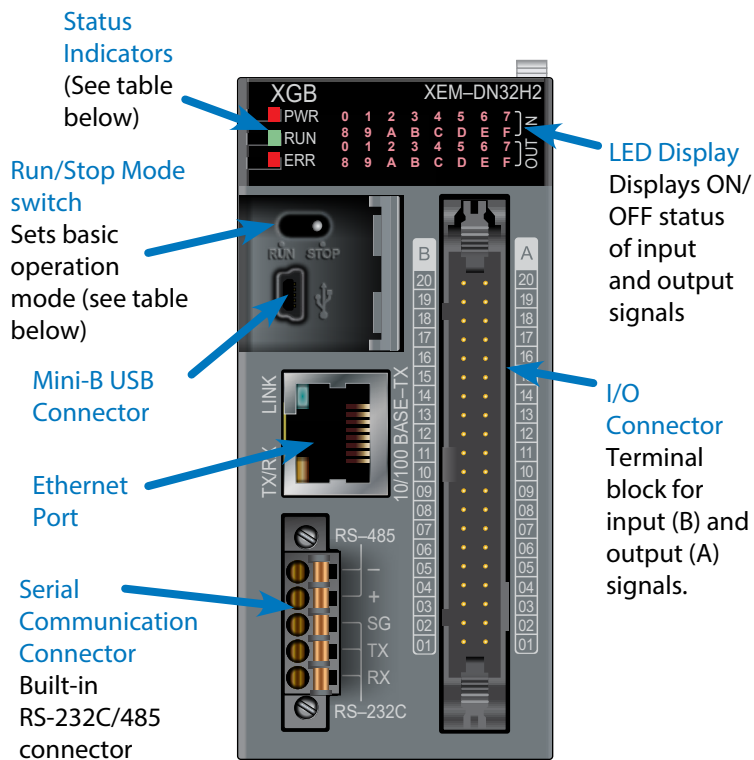
Features

- 8 DC inputs, 6 relay outputs (XEM-DR14H2)
- 8 DC inputs, 8 DC outputs (XEM-Dx16H2 series)
- 16 DC inputs, 16 DC outputs (XEM-Dx32Hx series)
- (4) 200kHz high speed counters
- 2- or 6-axis motion control (high speed pulse outputs)
- Control up to 16 PID loops with auto tuning capabilities
- Expand I/O capability with up to 7 add-on modules
- 22 different option modules available to handle digital, analog, counter input, and communications
- EtherCAT® motion modules offer position control for up to 16 EtherCAT® servo drives
- XG5000 software with IEC 61131 programming languages: Ladder, Structured Text, SFC, and IL. Includes XG-PM software for table-based motion configuration and testing

PLC (CPU with I/O) Feature Breakdown

Part Number	Price	Built-in I/O			Max Option Cards	USB	Ethernet	RS-232C	RS-485	Memory Backup	Online Editing	Drawing
		Motion Axis	Inputs	Outputs								
XEM-DR14H2	\$06c0d:	–	8 sink/source	6 relay	7	Yes (mini-B)	Yes (10/100Base-T)	Yes	Yes	Memory: Non-Volatile RAM RTC: 6 month backup (No battery)	Yes	PDF
XEM-DN16H2	\$06c0b:	2		8 sink								PDF
XEM-DP16H2	\$06c0c:	2		8 source								PDF
XEM-DN32H2	\$;05j4[:	2	16 sink/source	16 sink								PDF
XEM-DP32H2	\$;05j4#:	2		16 source								PDF
XEM-DN32HP	\$;05j4_:	6		16 sink								PDF
XEM-DP32HP	\$;05j4!:	6		16 source								PDF

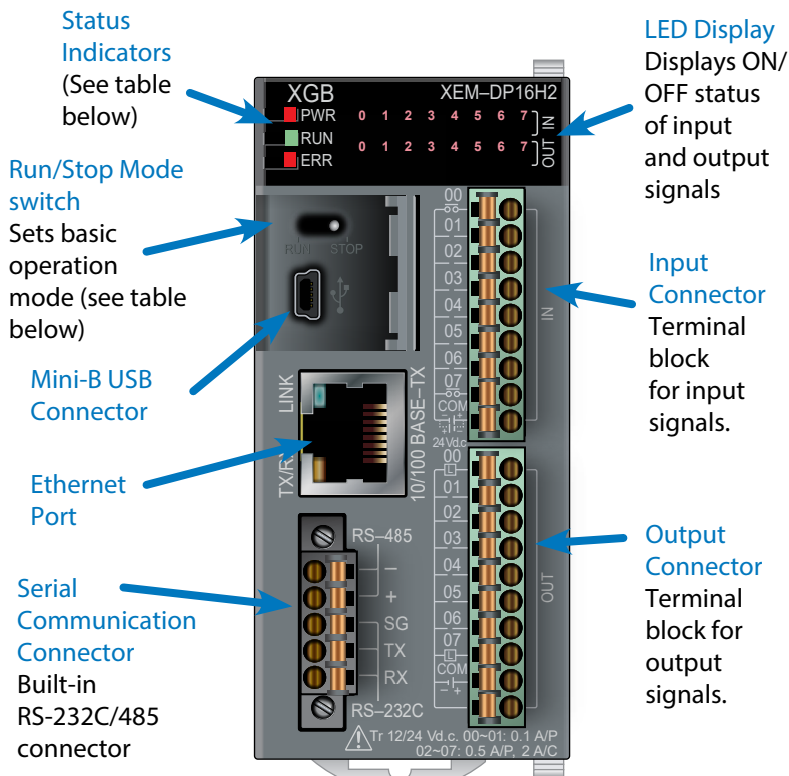
XEM 32-series Configuration



CPU Status Indicators	
PWR	Red LED is illuminated when power is on.
RUN	Green LED is illuminated when PLC is in RUN mode.
ERR	Red LED is illuminated to indicate program error(s).

CPU RUN/STOP Switch	
RUN position	Executes user program.
STOP position	Normal program load position. Allows for Remote Run from XG5000.

XEM 14/16-series Configuration



XGB Series PLC - Basic System Setup

Follow the steps below to select and configure the fundamental components needed to get your XEM CPU module up and running. You can also access several quick start video guides here: [Building and Powering the LS PLC Rack](#)

- 1 Select your XEM CPU module, and Smart Link cable/terminal block (for 32-series CPUs).
See "Smart Link I/O System" on page tLSE-131 for cable and terminal block part numbers.

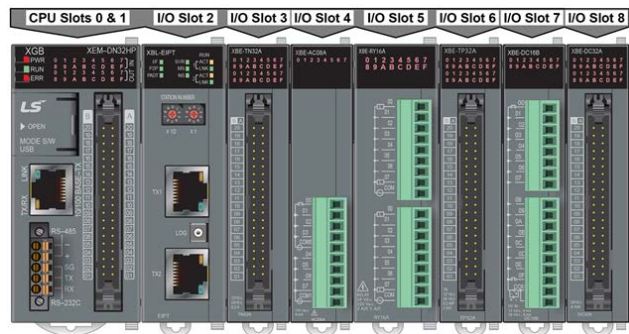
Note: Cable and terminal block only required for XEM-DN32H2, XEM-DN32HP, XEM-DP32H2, and XEM-DP32HP.



Note: Screwdriver size 04/2.5

- 2 Select and install up to seven option modules. 32-point I/O and counter input modules will require a Smart Link cable and terminal block. EtherCAT modules must be added to Slot 2 and 3 only.

Use the Product Selector to help configure the PLC at automationdirect.com/ls/config.



Note: Screwdriver size 2.5 mm

- 3 Connect user-supplied 24VDC power. Connect power to the XEM module, then connect power to the XTB-40H terminal block and any installed I/O modules.

Note: XGB-CON-3PX cable pigtail is included with the CPU.



USB Connection
MOSAIC-CSU

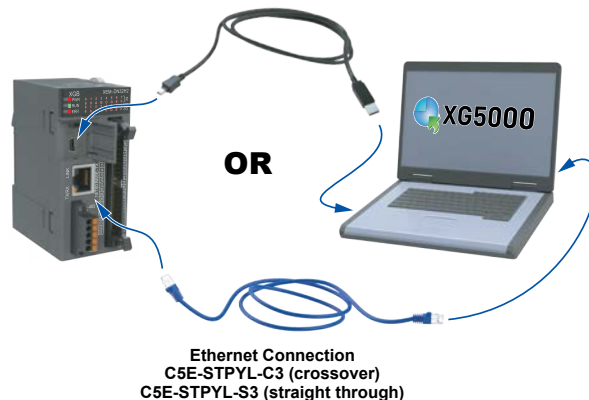
- 4 Choose programming cable, either a USB connection cable or Ethernet cable.

To connect via USB:

[USB Connection to XEM CPU](#)

To connect via Ethernet:

[Ethernet Connection to XEM CPU](#)



Ethernet Connection
C5E-STPYL-C3 (crossover)
C5E-STPYL-S3 (straight through)



XGB CPU Modules

Performance Specifications

Specification			Part Number						
			XEM-DR14H2	XEM-DN16H2	XEM-DP16H2	XEM-DN32H2	XEM-DP32H2	XEM-DN32HP	XEM-DP32HP
Power Specifications	Input	Input Voltage Range	20.4–28.8 VDC (-15% to +20%)						
		Rated Input Voltage	24VDC						
		Input Current	1A or less						
		Efficiency	60% or more						
		Permitted Momentary Power Failure	1ms or less						
	Output	Rated Output Voltage	5VDC (±2%)						
		Output Current	2.0 A						
	Power Supply Status Indication		LED On when power supply is normal						
	Cable Specification		0.75–2 mm ²						
Program Control Method			Cyclic execution of stored program, time-driven interrupt, process-driven interrupt						
I/O Control Method			Batch processing by simultaneous scan (refresh method), directed by program instruction						
Programming Languages			LD (Ladder Diagram), ST (Structured Text), SFC (Sequential Function Chart), IL (Instruction List)						
Programming Instructions	Operator (LD only)		11						
	Extension (LD, ST, IL)		9 (Break, Call, End, For, Jmp, Next, Ret, Sbrt, Init_Done)						
	Function (LD, ST, IL)		400+ (295+ for Data Tpe Conversion)						
	Function Block (LD & ST)		300+ (80+ motion specific)						
	Sequential Function Chart		7						
Special Features/Instructions			User Defined Data Type, User Defined Functions/Function Blocks						
Processing Speed (Basic Instruction)			40ns/step						
Program Capacity			384kb						
Maximum Base Rack I/O Points			(PLC + 7 option cards), Digital=(PLC Built-in) + (32 point I/O x 7 slots), Analog=(8 point AI x 7 slots)						
			Digital: 238 total Analog: 56 total	Digital: 240 total Analog: 56 total		Digital: 256 total Analog: 56 total			
Data Area (User Assigned)	Symbolic Variable		64KB (retain selectable by individual variable)						
	Direct Variables	M	32KB (retain configurable - by block)						
		W	64KB (retain)						
Data Area (PLC Reserved)	Input Variables	I	2KB (%IX0.0.0–%IX15.15.63)						
	Output Variables	Q	2KB (%QX0.0.0–%QX15.15.63)						
	Flag Variables	F	4KB						
		K	8KB						
		L	8KB						
		U	0.5 KB						
	P2P Service Variables	N	20KB						
Total Program			256						
Task	Initialization Task		1						
	Cycle Time Task		Max 16						
	I/O Task		Max 8						
	Internal Device Task		Max 16						
	High Speed Counter Task		Max 4						
	Position Control Task		1						
Operation Mode			RUN, STOP, DEBUG						
Self-diagnosis Function			Detects errors of scan time, memory, I/O and power supply						
Program Port			USB Mini-B type, USB 1 channel						
Retain Area Setup			Retain area setting in basic parameter						
Internal Consumption Current			540mA						
Max Number of Comm. Modules			2						
Weight			150g (5.29 oz)	140g (4.94 oz)	140g (4.94 oz)	134g (4.73 oz)	140g (4.94 oz)	134g (4.73 oz)	140g (4.94 oz)



XGB CPU Modules

Built-in Functions

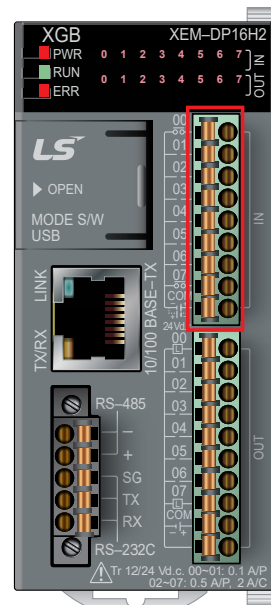
Specification			Part Number						
			XEM-DR14H2	XEM-DN16H2	XEM-DP16H2	XEM-DN32H2	XEM-DP32H2	XEM-DN32HP	XEM-DP32HP
Number of Motion Control Axis			–	2-axis				6-axis	
Interpolation Function			–	2-axis linear interpolation 2-axis circular interpolation				2/3/4/5/6 axis linear interpolation 2-axis circular interpolation 3-axis helical interpolation	
High Speed Counter	Performance	1 phase	200kHz						
		2 phase	100kHz						
	Channels	1 phase	4 channels						
		2 phase	2 channels						
	Counter Mode		4 counter modes are supported: - Single pulse counter mode with 1 pulse input - Pulse and direction counter mode with 2 pulse inputs - CW/CCW counter mode with 2 pulse inputs - Quadrature (Phase A/B) counter mode with 2 pulse inputs						
	Function		Internal/external preset, Latch counter, Compare output, Number of rotations per unit time						
High Speed Pulse Output Motion Control	Basic Function	Control Method	n/a XEM-DR14H2 does not support motion control	Position control, Speed control, Speed/Position control, Position/Speed control					
		Control Unit		Pulse, mm, inch, degree					
		Position Data		400 steps for each axis (1–400)					
		Operation Mode		End, Keep, Continuous					
		Operation Method		Single, Repeat					
	Position	Control		Absolute method/Incremental method					
		Address Range		-2,147,483,648 – 2,147,483,647 (Pulse)					
		Speed		200kHz max					
		Acc/Dec Processing		Trapezoid-shaped, S-curve					
	Homing Method			DOG+HOME (Off), DOG+HOME (On), Upper/Lower limit + HOME, DOG, High speed, Upper/Lower limit, HOME					
	Jog Operation			Jog operation, Inching operation, Manual Pulse Generator operation					
Pulse Catch			10μs 4-point (%IX0.0.0–%IX0.0.3), 50μs 4-point (%IX0.0.4–%IX0.0.7)						
External Point Interrupt			10μs 4-point (%IX0.0.0–%IX0.0.3), 50μs 4-point (%IX0.0.4–%IX0.0.7)						
Input Filter			1,3,5,10,20,70,100 ms						
PID Control			Max. 16 PID loops, Control by instruction, Auto-tuning, PWM output, Forced output, Operation scan time setting, Antiwindup, Delta MV, SV lamp, Hybrid operation, Cascade operation						
Serial (Cnet)	Protocol		Modbus RTU/ASCII, XGT Dedicated, User-defined						
	Channel		1 RS-232C port, 1 RS-485 port						
Ethernet (FEnet)	Transfer Spec		Cable: 100Base-TX, Speed: 100Mbps, Auto-MDIX ¹ , IEEE 802.3						
	Topology		Star						
	Diagnosis		Module information, Service condition						
	Protocol/Usage		Modbus TCP/IP Client and Server, Email (SMTP client), XGT dedicated, User Define frame, Programming/Online Monitoring						
	Channel		1 port 10/100MB Ethernet						
	Service		P2P, High Speed link, Remote connection, SMTP, SNMP, Auto scan						

1 - Auto-MDIX (Automation medium-dependent interface crossover) automatically detects whether the cable connected to the Ethernet port is peer-to-peer (straight) or crossover cable.

Digital Input Specifications, XEM-DR14H2, XEM-DN/DP16H2

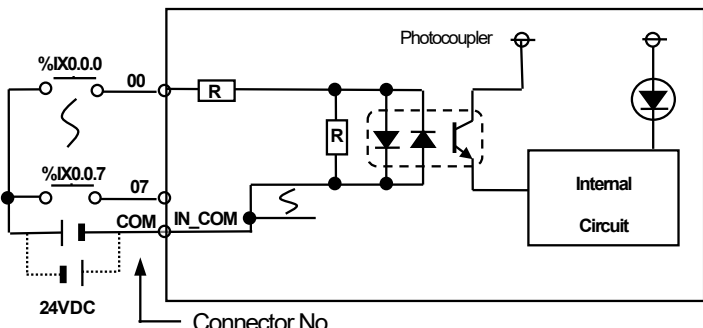
8-point 24VDC Input (Sink/Source Type) Specifications

Model	XEM-DR14H2	XEM-DN16H2	XEM-DP16H2
Input Point	8 point		
Insulation Method	Photocoupler Insulation		
Rated Input Volage	24VDC		
Rated Input Current	~4mA (Inputs 0-3 about 5mA)		
Operation Voltage Range	20.4-28.8 VDC (within ripple rate 5%)		
On Voltage	19VDC or higher		
On Current	3mA or higher (Inputs 0-3 about 3.5 mA or higher)		
Off Voltage	6VDC or less		
Off Current	1mA or less		
Input Resistance	About 5.6 k Ω (Inputs 0-3 about 4.7 k Ω)		
Response Time	Off $\rightarrow$ On On $\rightarrow$ Off 1/3/5/10/20/70/100 ms (set by I/O parameter) Default: 3ms		
Insulation Pressure	AC850Vrms / 3 cycle (altitude 2000m)		
Insulation Resistance	10M Ω or more by MegOhmMeter		
Common Method	8 point / COM		
Proper Cable Size	0.3 mm ²		
Operation Indicator	LED On when Input On		
External Connection Method	9 point terminal block connector		



Note: Red box highlights pins of the CPU inputs.

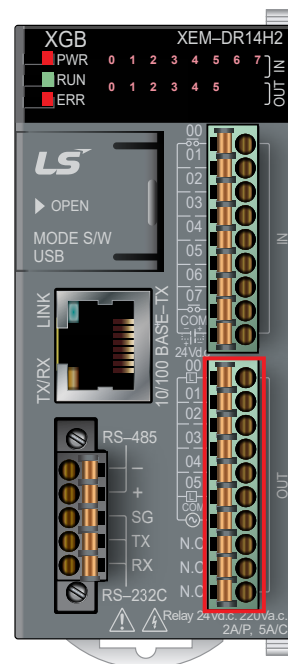
8-point 24VDC Input (Sink/Source Type) Circuit Configuration

Circuit Configuration	XEM Pin#	I/O Direct Variable	Description
	00	%IX0.0.0	High Speed Counter Inputs 1 phase- 200kpps 4 channel 2 phase- 100kpps 2 channel or General Input
	01	%IX0.0.1	
	02	%IX0.0.2	
	03	%IX0.0.3	
	04	%IX0.0.4	Preset Input or General Input
	05	%IX0.0.5	
	06	%IX0.0.6	
	07	%IX0.0.7	
	COM	IN_COM	Common

Digital Output Specifications, XEM-DR14H2

6-point Relay Output Specifications

Model	XEM-DR14H2	
Input Point	6 point	
Insulation Method	Relay Insulation	
Rated Load Voltage	24VDC 2A (resistive load) / 220VAC 2A (COS θ =1), 5A/COM	
Minimum Load Voltage/Current	5VDC / 1mA	
Max Load Voltage	250VAC, 125VDC	
Off Leakage Current	0.1 mA or less (220VAC, 60Hz)	
Max. On/Off Frequency	3,600 times/hr	
Over Voltage Protection	None	
Service Life	Mechanical	20 million times or more
	Electrical	Rated load voltage / current: 100,000 times or more
		200VAC/1.5 A, 240VAC/1A (COS θ =0.7): 100,000 times or more
		200VAC/1A, 240VAC/0.5 A (COS θ =0.35): 100,000 times or more
Response Time	Off $\rightarrow$ On	10ms or less
	On $\rightarrow$ Off	12ms or less
Common Method	6 points / COM	
Proper Wire Size	Stranded wire, 0.3–0.75 mm ² (external diameter 2.8 mm or less)	
Current Consumption	385mA (when all points ON)	
Operation Indicator	LED On when Output On	
External Connection Method	10 point terminal block connector	



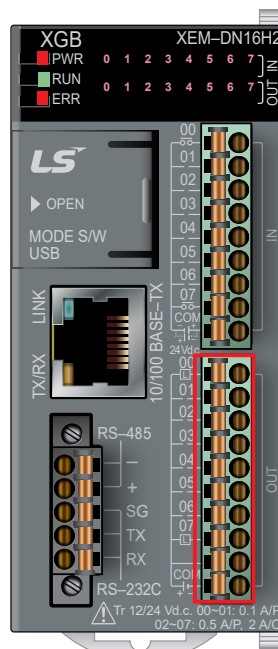
6-point Relay Output Circuit Configuration

Circuit Configuration	XEM Pin#	I/O Direct Variable	Description
	00	%QX0.0.0	Relay Output 2A/pt
	01	%QX0.0.1	
	02	%QX0.0.2	
	03	%QX0.0.3	
	04	%QX0.0.4	
	05	%QX0.0.5	
	COM	OUT_COM	Common
	N.C.	N.C.	Not used
	N.C.	N.C.	
	N.C.	N.C.	

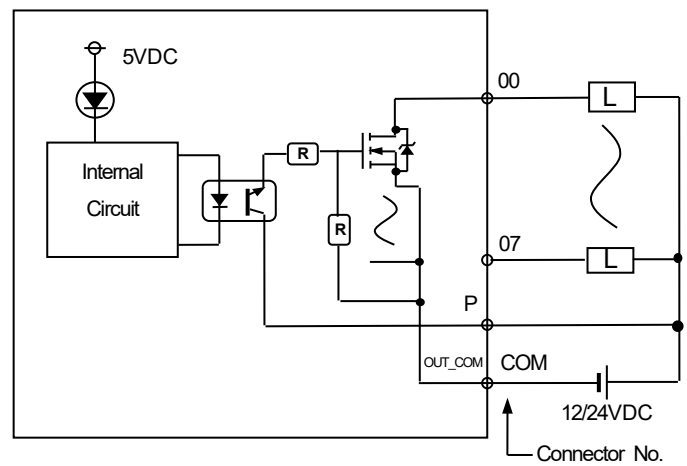
Digital Output Specifications, XEM-DN16H2

8-point Transistor Output (Sink Type) Specifications

Model	XEM-DN16H2
Input Point	8 point
Insulation Method	Photocoupler Insulation
Rated Load Voltage	12VDC / 24VDC
Operation Load Voltage Range	10.2–26.4 VDC
Max. Load Current	%QX0.0,0,1: 0.1A / 1-point, %QX0.0,2–7: 0.5 A / 1-point, 2A / 1COM
Off Leakage Current	0.1 mA or less
Max. Inrush Current	4A / 10ms or less
Max. Voltage Drop when On	0.4 VDC or less
Over Voltage Protection	TVS diode
Response Time	Off → On: 1ms or less On → Off: 1ms or less (rated load, resistive load)
Common Method	8 point / COM
Proper Wire Size	Stranded wire, 0.3–0.75 mm ² (external diameter 2.8 mm or less)
External Power	Voltage: 12VDC / 24VDC ± 10% (ripple voltage 4 Vp-p or less) Current: 35mA or less (when connecting 24VDC)
Operation Indicator	LED On when Output On
External Connection Method	10 point terminal block connector



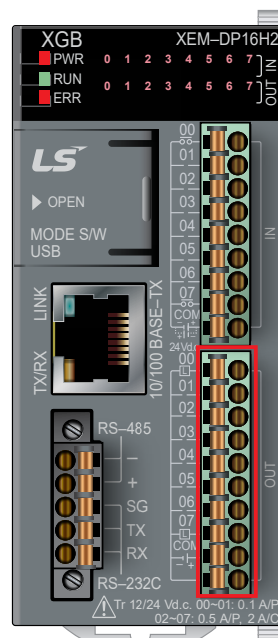
8-point Transistor Output (Sink Type) Circuit Configuration

Circuit Configuration	XEM Pin#	I/O Direct Variable	Description
	00	%QX0.0,0	Pulse- Axis1 or General Output 0.1A/pt
	01	%QX0.0,1	Pulse- Axis2 or General Output 0.1A/pt
	02	%QX0.0,2	General Output 0.5A/pt
	03	%QX0.0,3	
	04	%QX0.0,4	
	05	%QX0.0,5	
	06	%QX0.0,6	Direction- Axis 1 or General Output 0.5A/pt
	07	%QX0.0,7	Direction- Axis 2 or General Output 0.5A/pt
	–	–	+24VDC from supply
	COM	OUT_COM	0VDC from supply

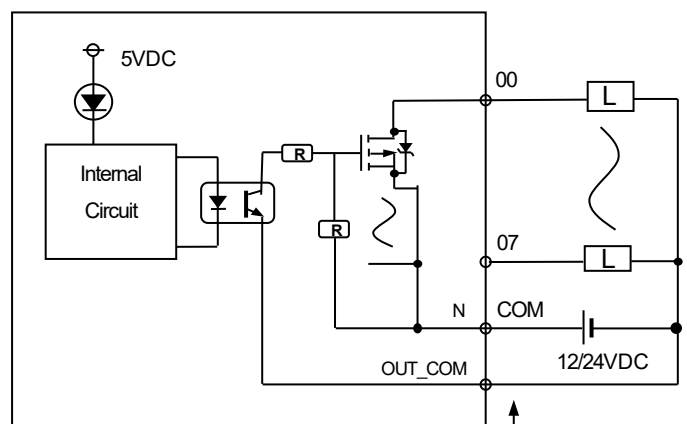
Digital Output Specifications, XEM-DP16H2

8-point Transistor Output (Source Type) Specifications

Model	XEM-DP16H2
Input Point	8 point
Insulation Method	Photocoupler Insulation
Rated Load Voltage	12VDC / 24VDC
Operation Load Voltage Range	10.2–26.4 VDC
Max. Load Current	%QX0.0.0,1: 0.1A / 1-point, %QX0.0.2–7: 0.5A / 1-point, 2A / 1COM
Off Leakage Current	0.1 mA or less
Max. Inrush Current	4A / 10ms or less
Max. Voltage Drop when On	0.4 VDC or less
Over Voltage Protection	TVS diode
Response Time	Off → On: 1ms or less On → Off: 1ms or less (rated load, resistive load)
Common Method	8 point / COM
Proper Wire Size	Stranded wire, 0.3–0.75 mm ² (external diameter 2.8 mm or less)
External Power	Voltage: 12VDC / 24VDC ± 10% (ripple voltage 4 Vp-p or less) Current: 30mA or less (when connecting 24VDC)
Operation Indicator	LED On when Output On
External Connection Method	10 point terminal block connector



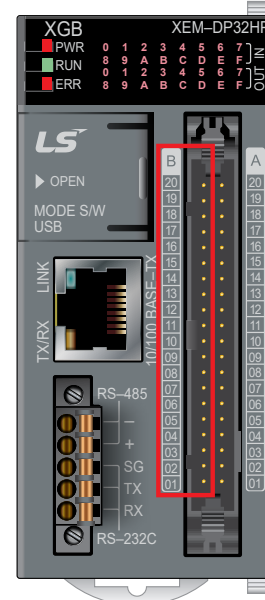
8-point Transistor Output (Source Type) Circuit Configuration

Circuit Configuration	XEM Pin#	I/O Direct Variable	Description
	00	%QX0.0.0	Pulse- Axis1 or General Output 0.1A/pt
	01	%QX0.0.1	Pulse- Axis2 or General Output 0.1A/pt
	02	%QX0.0.2	General Output 0.5A/pt
	03	%QX0.0.3	
	04	%QX0.0.4	
	05	%QX0.0.5	
	06	%QX0.0.6	Direction- Axis 1 or General Output 0.5A/pt
	07	%QX0.0.7	Direction- Axis 2 or General Output 0.5A/pt
	COM	OUT_COM	+24VDC from supply
	-	-	0VDC from supply

Digital Input Specifications, XEM-DN32H2/HP and XEM-DP32H2/HP

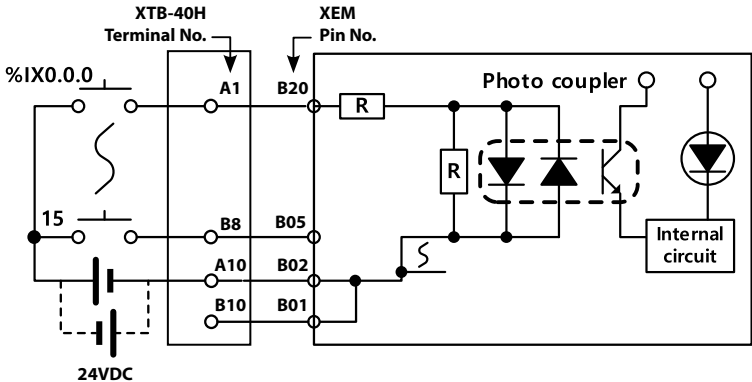
16-point 24VDC Input (Sink/Source Type) Specifications

Model		XEM-DN32H2	XEM-DP32H2	XEM-DN32HP	XEM-DP32HP
Input Point		16 point			
Insulation Method		Photocoupler Insulation			
Rated Input Voltage		24VDC			
Rated Input Current		~4mA (Inputs 0–3 about 7mA)			
Operation Voltage Range		20.4–28.8 VDC (within ripple rate 5%)			
On Voltage		19VDC or higher			
On Current		3mA or higher			
Off Voltage		6VDC or less			
Off Current		1mA or less			
Input Resistance		About 5.6 kΩ (Inputs 0–7 about 4.7 kΩ)			
Response Time	Off → On	1/3/4/10/20/70/100 ms (set by I/O parameter) Default: 3ms			
	On → Off				
Insulation Pressure		AC560Vrms / 3 cycle (altitude 2000m)			
Insulation Resistance		100MΩ or more by MegOhmMeter			
Common Method		16 point / COM			
Proper Cable Size		0.3 mm ²			
Operation Indicator		LED On when Input On			
External Connection Method		40 point connector			



Note: Red box highlights pins of the CPU inputs.

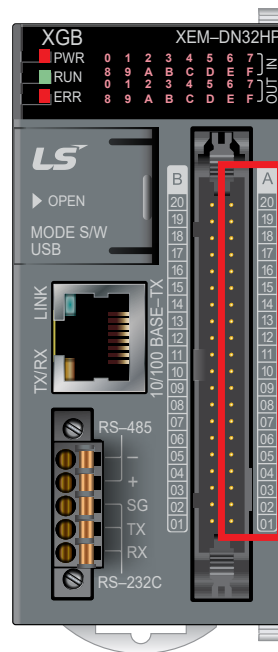
16-point 24VDC Input (Sink/Source Type) Circuit Configuration

Circuit Configuration	XTB-40H Terminal	XEM Pin#	I/O Direct Variable	Description
	A1	B20	%IX0.0.0	High Speed Counter Inputs 1 phase- 200kpps 4 channel 2 phase- 100kpps 2 channel or General Input
	B1	B19	%IX0.0.1	
	A2	B18	%IX0.0.2	
	B2	B17	%IX0.0.3	
	A3	B16	%IX0.0.4	Preset Input or General Input
	B3	B15	%IX0.0.5	
	A4	B14	%IX0.0.6	General Input
	B4	B13	%IX0.0.7	
	A5	B12	%IX0.0.8	General Input
	B5	B11	%IX0.0.9	General Input
	A6	B10	%IX0.0.10	General Input
	B6	B09	%IX0.0.11	General Input
	A7	B08	%IX0.0.12	General Input
	B7	B07	%IX0.0.13	General Input
	A8	B06	%IX0.0.14	General Input
	B8	B05	%IX0.0.15	General Input
	A9	B04	-	Not used (NC)
	B9	B03	-	Not used (NC)
	A10	B02	-	Common
	B10	B01	-	Common

Digital Output Specifications, XEM-DN32H2 and XEM-DN32HP

16-point Transistor Output (Sink Type) Specifications

Model	XEM-DN32H2	XEM-DN32HP
Input Point	16 point	
Insulation Method	Photocoupler Insulation	
Rated Load Voltage	12VDC / 24VDC	
Operation Load Voltage Range	10.2–26.4 VDC	
Max. Load Current	%QX0.0.0–11: 0.1A / 1-point, %QX0.0.12–15: 0.5 A/ 1-point, 2A / 1COM	
Off Leakage Current	0.1 mA or less	
Max. Inrush Current	4A / 10ms or less	
Max. Voltage Drop when On	0.4 VDC or less	
Over Voltage Protection	TVS diode	
Response Time	Off → On	1ms or less
	On → Off	1ms or less (rated load, resistive load)
Common Method	16-point / COM	
Proper Wire Size	Stranded wire, 0.3–0.75 mm ² (external diameter 2.8 mm or less)	
External Power	Voltage	12VDC / 24VDC ± 10% (ripple voltage 4 Vp-p or less)
	Current	80mA or less (when connecting 24VDC)
Operation Indicator	LED On when Output On	
External Connection Method	40-point connector	



16-point Transistor Output (Sink Type) Circuit Configuration

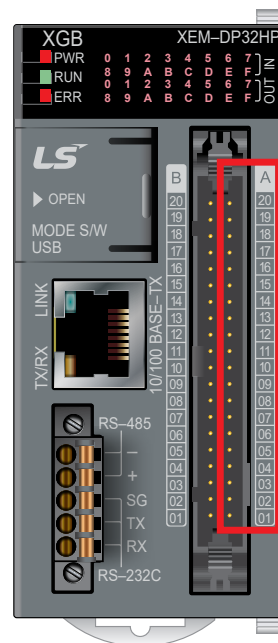
Circuit Configuration	XTB-40H Terminal	XEM Pin#	I/O Direct Variable	Description
	A11	A20	%QX0.0.0	Pulse- Axis1 or General Output 0.1A/pt
	B11	A19	%QX0.0.1	Pulse- Axis2 or General Output 0.1A/pt
	A12	A18	%QX0.0.2	Pulse- Axis3* or General Output 0.1A/pt
	B12	A17	%QX0.0.3	Pulse- Axis4* or General Output 0.1A/pt
	A13	A16	%QX0.0.4	Pulse- Axis5* or General Output 0.1A/pt
	B13	A15	%QX0.0.5	Pulse- Axis6* or General Output 0.1A/pt
	A14	A14	%QX0.0.6	Direction- Axis 1 or General Output 0.1A/pt
	B14	A13	%QX0.0.7	Direction- Axis 2 or General Output 0.1A/pt
	A15	A12	%QX0.0.8	Direction- Axis 3* or General Output 0.1A/pt
	B15	A11	%QX0.0.9	Direction- Axis 4* or General Output 0.1A/pt
	A16	A10	%QX0.0.10	Direction- Axis 5* or General Output 0.1A/pt
	B16	A09	%QX0.0.11	Direction- Axis 6* or General Output 0.1A/pt
	A17	A08	%QX0.0.12	General Outputs - 0.5A/pt
	B17	A07	%QX0.0.13	General Outputs - 0.5A/pt
	A18	A06	%QX0.0.14	General Outputs - 0.5A/pt
	B18	A05	%QX0.0.15	General Outputs - 0.5A/pt
	A19	A04	–	P (24VDC)
	B19	A03	–	P (24VDC)
	A20	A02	–	OUT_COM
	B20	A01	–	OUT_COM
				2.0A/common

* Note: DN32HP module only

Digital Output Specifications, XEM-DP32H2 and XEM-DP32HP

16-point Transistor Output (Source Type) Specifications

Model	XEM-DP32H2	XEM-DP32HP
Input Point	16 point	
Insulation Method	Photocoupler Insulation	
Rated Load Voltage	12VDC / 24VDC	
Operation Load Voltage Range	10.2–26.4 VDC	
Max. Load Current	%QX0.0.0–11: 0.1A / 1-point %QX0.0.12–15: 0.5 A / 1-point, 2A / 1COM	
Off Leakage Current	0.1 mA or less	
Max. Inrush Current	4A / 10ms or less	
Max. Voltage Drop when On	0.4 VDC or less	
Over Voltage Protection	TVS diode	
Response Time	Off → On	1ms or less
	On → Off	1ms or less (rated load, resistive load)
Common Method	16-point / COM	
Proper Wire Size	Stranded wire, 0.3–0.75 mm ² (external diameter 2.8 mm or less)	
External Power	Voltage	12VDC / 24VDC ± 10% (ripple voltage 4 Vp-p or less)
	Current	50mA or less (when connecting 24VDC)
Operation Indicator	LED On when Output On	
External Connection Method	40-point connector	



16-point Transistor Output (Source Type) Circuit Configuration

Circuit Configuration	XTB-40H Terminal	XEM Pin#	I/O Direct Variable	Description
	A11	A20	%QX0.0.0	Pulse- Axis1 or General Output 0.1A/pt
	B11	A19	%QX0.0.1	Pulse- Axis2 or General Output 0.1A/pt
	A12	A18	%QX0.0.2	Pulse- Axis3* or General Output 0.1A/pt
	B12	A17	%QX0.0.3	Pulse- Axis4* or General Output 0.1A/pt
	A13	A16	%QX0.0.4	Pulse- Axis5* or General Output 0.1A/pt
	B13	A15	%QX0.0.5	Pulse- Axis6* or General Output 0.1A/pt
	A14	A14	%QX0.0.6	Direction- Axis 1 or General Output 0.1A/pt
	B14	A13	%QX0.0.7	Direction- Axis 2 or General Output 0.1A/pt
	A15	A12	%QX0.0.8	Direction- Axis 3* or General Output 0.1A/pt
	B15	A11	%QX0.0.9	Direction- Axis 4* or General Output 0.1A/pt
	A16	A10	%QX0.0.10	Direction- Axis 5* or General Output 0.1A/pt
	B16	A09	%QX0.0.11	Direction- Axis 6* or General Output 0.1A/pt
	A17	A08	%QX0.0.12	General Outputs - 0.5A/pt
	B17	A07	%QX0.0.13	General Outputs - 0.5A/pt
	A18	A06	%QX0.0.14	General Outputs - 0.5A/pt
	B18	A05	%QX0.0.15	General Outputs - 0.5A/pt
	A19	A04	–	OUT_COM
	B19	A03	–	OUT_COM
	A20	A02	–	N (0VDC)
	B20	A01	–	N (0VDC)

* Note: DP32HP module only

PLC I/O Wiring (Sinking Outputs), XEM-DN32H2/HP

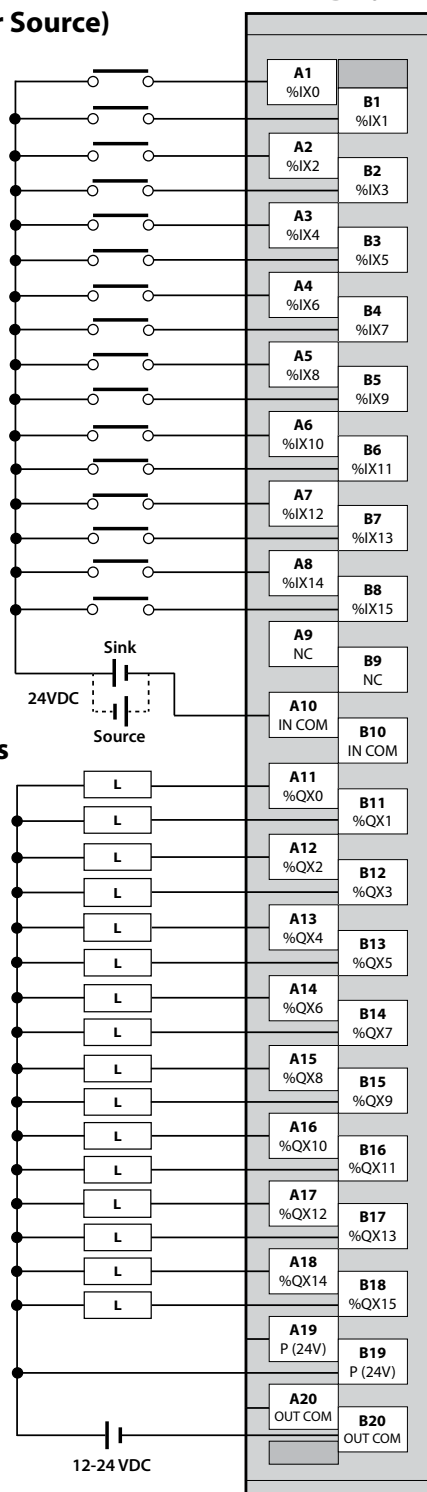
Download module specific XTB-40H Terminal Label Printouts here: [Download Printouts](#)

Terminal Wiring

Inputs

(Sink or Source)

XTB-40H

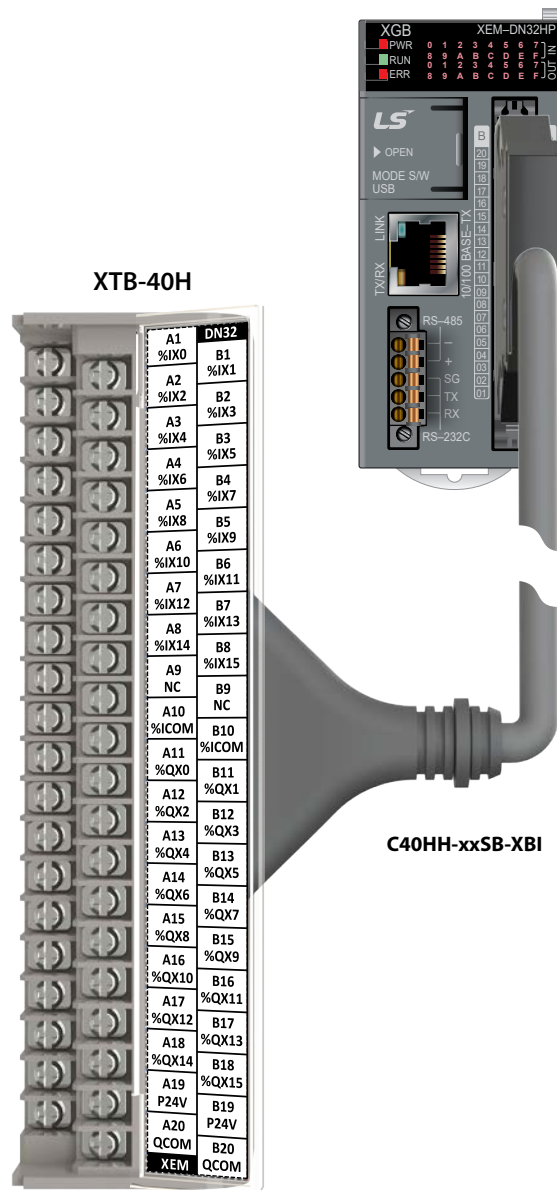


Outputs

(Sink)

PLC Connection

XEM PLC



Note:

- Wiring: AWG22-16 (1.5mm²/MAX)
- Screw: M3 X 8L
- Screw Torque: 1.2 N·m (12kgfcm)

PLC I/O Wiring (Sourcing Outputs), XEM-DP32H2/HP

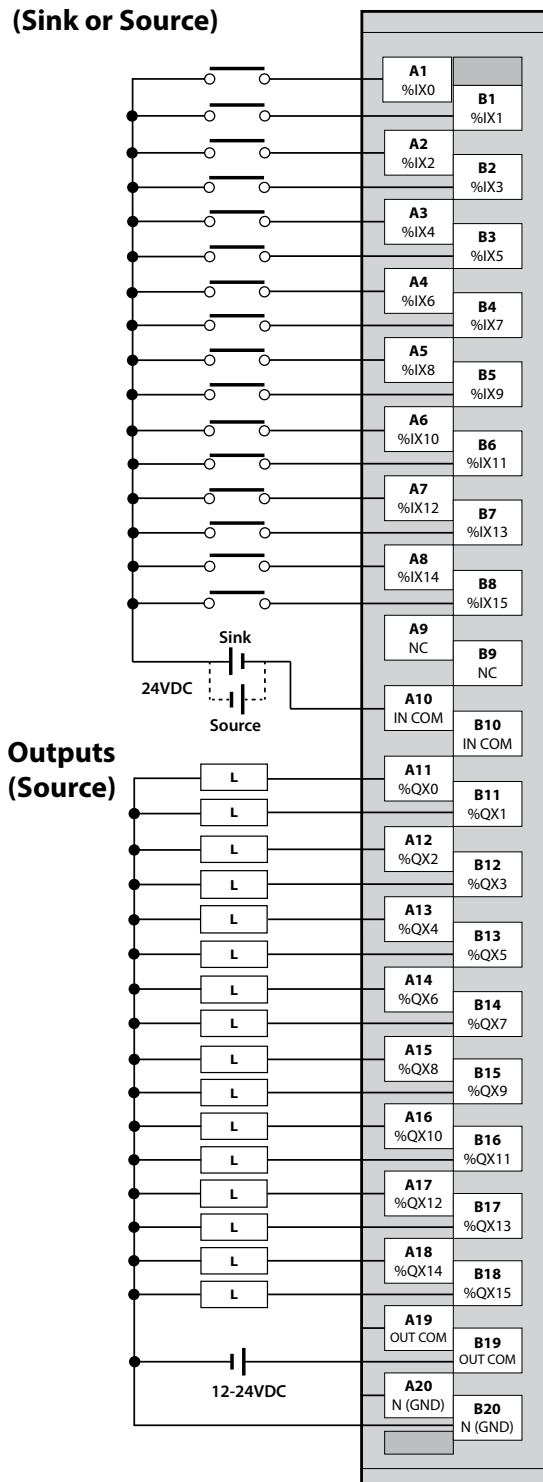
Download module specific XTB-40H Terminal Label Printouts here: [Download Printouts](#)

Terminal Wiring

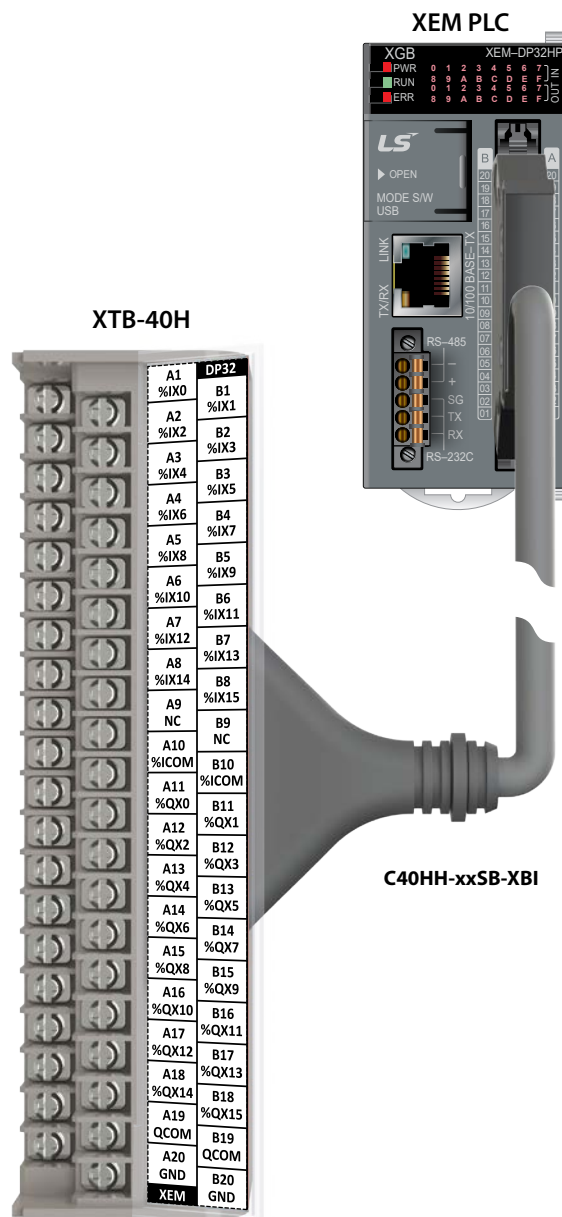
Inputs

(Sink or Source)

XTB-40H



PLC Connection

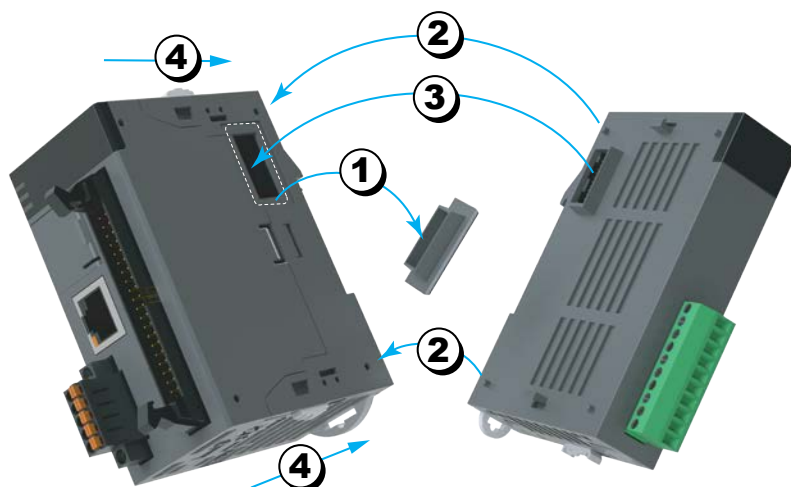


Note:

- Wiring: AWG22-16 (1.5mm²/MAX)
- Screw: M3 X 8L
- Screw Torque: 1.2 N·m (12kgf·cm)

I/O Module Installation

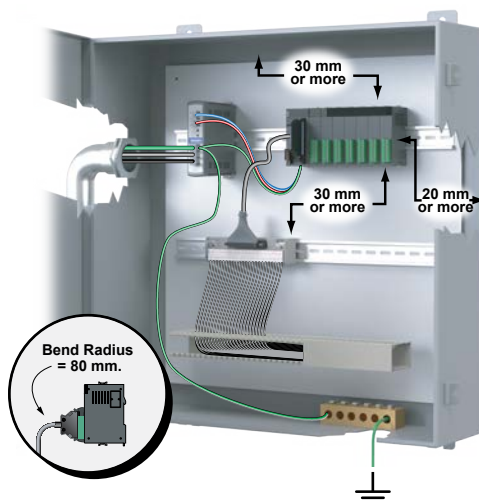
Attach each I/O module to the PLC per the diagram to the right. Up to seven modules can be attached by hooking in to each expansion module in the same manner. Any 32-point I/O and counter input module will require a Smart Link cable and terminal block. Use the online Product Selector to help configure the PLC at automationdirect.com/ls/config.



1. Remove expansion port cover.
2. Align tabs with corresponding holes.
3. Seat the expansion port connector.
4. Secure modules with top and bottom sliding lock.

Mounting the PLC

When mounting the completed PLC module to your structure, keep the distances shown in the diagram below to maintain proper ventilation and allow easy detachment and attachment.



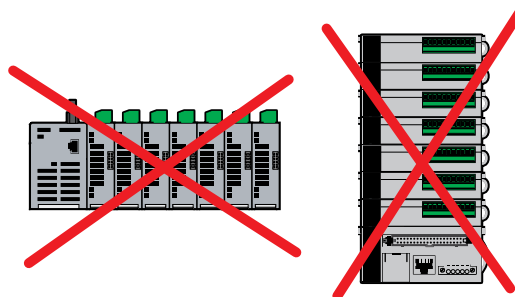
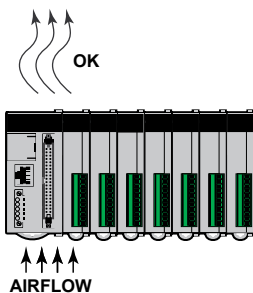
Additional Clearance Distances:

- Wire duct on the side requires 5mm or more
- Panel wall on the side requires 20mm or more
- Another device on the side requires 50mm or more

DIN Rail Mounting

The PLC has a hook for DIN rail mounting (35mm). To mount to DIN rail:

- Pull the hook as shown below at the bottom of module and install it at the DIN rail.
- Push the hook to fix the module to the rail after installing.





XGB Series PLC Family

Environmental Specifications, all XGB Series Modules

Item				Specification	Reference
Ambient Operating Temperature				0–55°C (32–131°F)	–
Storage Temperature				-25–70°C (-13–158°F)	
Ambient Operating Humidity				5–95% relative humidity (non-condensing)	
Storage Humidity				5–95% relative humidity (non-condensing)	
Vibration ¹	Occasional Vibration	Frequency	$5 \leq f < 8.4 \text{ Hz}$	3.5 mm pulse width	IEC61131-3-2
			$8.4 \leq f < 150\text{Hz}$	9.8 m/s ² (1G)	
	Continuous Vibration		$5 \leq f < 8.4 \text{ Hz}$	1.75 mm pulse width	
			$8.4 \leq f < 150\text{Hz}$	4.9 m/s ² (0.5G)	
Shocks		Peak Acceleration	147 m/s ² (15G)		
		Duration	11ms		
		Pulse Wave Type	Half-sine (3 times each direction per each axis)		
Noise Resistance	Square Wave Impulse Noise		1,500VAC 900VDC	LS Electric standard	
	Electrostatic Discharge		Voltage: 4kV (contact discharge)	IEC61131-3-2 IEC61000-4-2	
	Radiated Electromagnetic Field Noise		80–1,000 MHz, 10 V/m	IEC61131-3-2 IEC61000-4-3	
	Fast Transient / Burst Noise	Classification	Voltage	IEC61131-3-2 IEC61000-4-4	
		Power Supply	2kV		
		Digital/Analog Input/Output Communication Interface	1kV		
Environment				Free from corrosive gases and excessive dust	–
Attitude				Less than 2,000m	
Pollution Degree				Less than 2 (see note 2)	
Cooling Method				Air-cooling	

1 - Vibration of 10 times each direction (X, Y, and Z)

2 - Normally only nonconductive pollution occurs. Temporary conductivity caused by condensation is to be expected.



XGB Series PLC Family

Available I/O Modules

XGB Series I/O Modules									
Part Number	Price	Description	Digital Input	Digital Output	Analog Input	Analog Output	Motion	Bus Coupler Compatible	Smart Link Required
Digital									
<u>XBE-DC08A</u>	\$61ey:	LS Electric XGB discrete input module, 8-point, 24 VDC, sinking/sourcing, 1 common(s), 8 point(s) per common. Removable terminal block included.	✓					✓	
<u>XBE-DC16A</u>	\$:,5]4]:	LS Electric XGB discrete input module, 16-point, 24 VDC, sinking/sourcing, 1 common(s), 16 point(s) per common. Removable terminal blocks included.	✓					✓	
<u>XBE-DC16B</u>	\$:5]4?:	LS Electric XGB discrete input module, 16-point, 12-24 VDC, sinking/sourcing, 1 common(s), 16 point(s) per common. Removable terminal blocks included.	✓					✓	
<u>XBE-DC32A</u>	\$:,05]4.:	LS Electric XGB discrete input module, 32-point, 24 VDC, sinking/sourcing, 1 common(s), 32 point(s) per common. Requires XTB-40H terminal block and C40HH-xxSB-XBI cable.	✓					✓	✓
<u>XBE-AC08A</u>	\$:5]50:	LS Electric XGB discrete input module, 8-point, 120 VAC, 2 common(s), 4 point(s) per common. Removable terminal blocks included.	✓					✓	
<u>XBE-RY08A</u>	\$61eu:	LS Electric XGB relay output module, 8-point, 125 VDC/250 VAC, (8) Form A, 1 common(s), 8 point(s) per common, 2A/point, 5A/common. Removable terminal block included.		✓				✓	
<u>XBE-RY08B</u>	\$:05]51:	LS Electric XGB relay output module, 8-point, 125 VDC/250 VAC, (8) Form A, 8 isolated common(s), 1 point(s) per common, 2A/point. Removable terminal blocks included.		✓				✓	
<u>XBE-RY16A</u>	\$:05]52:	LS Electric XGB relay output module, 16-point, 125 VDC/250 VAC, (16) Form A, 2 isolated common(s), 8 point(s) per common, 2A/point, 5A/common. Removable terminal blocks included.		✓				✓	
<u>XBE-TN08A</u>	\$61ev:	LS Electric XGB discrete output module, 8-point, 12-24 VDC, sinking, 1 common(s), 8 point(s) per common, 0.5A/point, 2A/common. Removable terminal blocks included.		✓				✓	
<u>XBE-TN16A</u>	\$:5]54:	LS Electric XGB discrete output module, 16-point, 12-24 VDC, sinking, 1 common(s), 16 point(s) per common, 0.5A/point, 2A/common. Removable terminal blocks included.		✓				✓	
<u>XBE-TN32A</u>	\$:05]55:	LS Electric XGB discrete output module, 32-point, 12-24 VDC, sinking, 1 common(s), 32 point(s) per common, 0.2A/point, 2A/common. Requires XTB-40H terminal block and C40HH-xxSB-XBI cable.		✓				✓	✓
<u>XBE-TP08A</u>	\$61ex:	LS Electric XGB discrete output module, 8-point, 12-24 VDC, sourcing, 1 common(s), 8 point(s) per common, 0.5A/point, 2A/common. Removable terminal blocks included.		✓				✓	
<u>XBE-TP16A</u>	\$:5]56:	LS Electric XGB discrete output module, 16-point, 12-24 VDC, sourcing, 1 common(s), 16 point(s) per common, 0.5A/point, 2A/common. Removable terminal blocks included.		✓				✓	
<u>XBE-TP32A</u>	\$:05]57:	LS Electric XGB discrete output module, 32-point, 12-24 VDC, sourcing, 1 common(s), 32 point(s) per common, 0.2A/point, 2A/common. Requires XTB-40H terminal block and C40HH-xxSB-XBI cable.		✓				✓	✓
<u>XBE-DN32A</u>	\$:05]53:	LS Electric XGB discrete combo module, Input: 16-point, 24 VDC, sinking/sourcing, Output: 16-point, 12-24 VDC, sinking, 0.2A/point, 2A/common. Requires XTB-40H terminal block and C40HH-xxSB-XBI cable.	✓	✓				✓	✓
<u>XBE-DR16A</u>	\$061e#:	LS Electric XGB discrete combo module, Input: 8-point, 24 VDC, sinking/sourcing, Output: 8-point, 125 VDC/250 VAC, relay, (8) Form A (SPST) relays, 2A/point, 5A/common. Removable terminal blocks included.	✓	✓				✓	
Motion									
<u>XBF-PN04B</u>	\$:,05]5:	LS Electric XGB 4-axis positioning module, EtherCAT Master, 1 high-speed input point(s), sinking/line driver (differential), 1-channel, differential and single-ended encoder input(s), (1) Ethernet 100Base-TX (RJ45) port(s). For use with LS Electric XEM-DxxxHx PLCs.					✓		
<u>XBF-PN08B</u>	\$:,05]6:	LS Electric XGB 8-axis positioning module, EtherCAT Master, 1 high-speed input point(s), sinking/line driver (differential), 1-channel, differential and single-ended encoder input(s), (1) Ethernet 100Base-TX (RJ45) port(s). For use with LS Electric XEM-DxxxHx PLCs.					✓		
<u>XBF-HO02A</u>	\$:05]5e:	LS Electric XGB counter input module, 200 kHz maximum switching frequency, 2 high-speed input point(s), 5-24 VDC, sinking, 2-channel, single-ended encoder input(s), 2 high-speed output point(s), 5-24 VDC, sinking, external 24 VDC required.					✓	✓	✓
<u>XBF-HD02A</u>	\$:,05]5f:	LS Electric XGB counter input module, 500 kHz maximum switching frequency, 2 high-speed input point(s), 5-24 VDC, sinking, 2-channel, differential encoder input(s), 2 high-speed output point(s), 5-24 VDC, sinking, external 24 VDC required.					✓	✓	✓

Note: See "Smart Link I/O System" on page tLSE-131 for the XTB-40H terminal block and cables. See "XGB PLC Replacement Terminals" on page tLSE-149 for replacement removable terminal blocks.

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XGB Series PLC Family

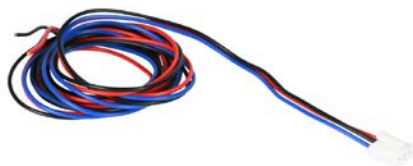
Available I/O Modules, *continued*

XGB Series I/O Modules									
Part Number	Price	Description	Digital Input	Digital Output	Analog Input	Analog Output	Motion	Bus Coupler Compatible	Smart Link Required
Analog									
<u>XBF-AD04A</u>	\$,05]58:	LS Electric XGB analog input module, 4-channel, current/voltage, 12-bit, input current signal range(s) of 0-20 mA, 4-20 mA, input voltage signal range(s) of 0-10 VDC, external 24 VDC required.			✓			✓	
<u>XBF-AD08A</u>	\$,05]59:	LS Electric XGB analog input module, 8-channel, current/voltage, 12-bit, input current signal range(s) of 0-20 mA, 4-20 mA, input voltage signal range(s) of 0-5 VDC, 1-5 VDC, 0-10 VDC, external 24 VDC required.			✓			✓	
<u>XBF-AD04C</u>	\$,05]5a:	LS Electric XGB analog input module, 4-channel, current/voltage, 14-bit, input current signal range(s) of 0-20 mA, 4-20 mA, input voltage signal range(s) of 0-5 VDC, 1-5 VDC, 0-10 VDC, +/- 10 VDC, external 24 VDC required.			✓			✓	
<u>XBF-DV04A</u>	\$,05]5b:	LS Electric XGB analog output module, 4-channel, voltage, 12-bit, output voltage signal range(s) of 0-10 VDC, external 24 VDC required.				✓		✓	
<u>XBF-DV04C</u>	\$,05]5c:	LS Electric XGB analog output module, 4-channel, voltage, 14-bit, output voltage signal range(s) of 0-5 VDC, 1-5 VDC, 0-10 VDC and +/- 10 VDC, external 24 VDC required.				✓		✓	
<u>XBF-DC04A</u>	\$,05]5g:	LS Electric XGB analog output module, 4-channel, current, 12-bit, output current signal range(s) of 0-20 mA and 4-20 mA, external 24 VDC required.				✓		✓	
<u>XBF-DC04C</u>	\$,05]5h:	LS Electric XGB analog output module, 4-channel, current, 14-bit, output current signal range(s) of 0-20 mA and 4-20 mA, external 24 VDC required.				✓		✓	
<u>XBF-AH04A</u>	\$,05]5d:	LS Electric XGB analog combo module, Input: 2-channel, current/voltage, 0-20 mA and 4-20 mA, 0-5 VDC, 1-5 VDC and 0-10 VDC, Output: 2-channel, current/voltage, 0-20 mA and 4-20 mA, 0-5 VDC, 1-5 VDC and 0-10 VDC.			✓	✓		✓	
<u>XBF-LD02S</u>	\$,061f1:	LS Electric XGB load cell input module, 2-channel, voltage, 15-bit resolution, input voltage signal range(s) of 0-6 mV/VDC. For use with 5 VDC four- or six-wire load cells. Removable terminal blocks included.			✓			✓	
<u>XBF-RD04A</u>	\$061e?:	LS Electric XGB temperature input module, RTD, 4-channel, 14-bit resolution, input RTD type(s): Pt100 and JPt100. Removable terminal block included.			✓			✓	
<u>XBF-TC04S</u>	\$,061e!:	LS Electric XGB temperature input module, thermocouple, 4-channel, 16-bit resolution, input thermocouple type(s): J, K, R, T. Removable terminal block included.			✓			✓	
Communication									
<u>XBL-EIPT</u>	\$,5]5n:	LS Electric XGB communication module, EtherNet/IP, 2 ports, (2) Ethernet 10/100Base-T (RJ45) port(s). For use with LS Electric XGB series PLCs.							
<u>XBL-EMTA</u>	\$061ez:	LS Electric XGB communication module, Modbus TCP and LS XGT protocol, 1 port, (1) Ethernet 10/100Base-T (RJ45) port(s). For use with LS Electric XGB series PLCs.							
<u>XBL-C21A</u>	\$,061e]:	LS Electric XGB communication module, Modbus RTU, Modbus ASCII and LS XGT protocol, 1 port, (1) RS-232 (DB9 female) port(s). For use with LS Electric XGB series PLCs.							
<u>XBL-C41A</u>	\$,061e]:	LS Electric XGB communication module, Modbus RTU, Modbus ASCII and LS XGT protocol, 1 port, (1) RS-422/RS-485 (5-pin terminal) port(s). For use with LS Electric XGB series PLCs. (1) 5-pin serial communication terminal block included.							
Bus Coupler									
<u>XEL-BSSRT</u>	\$,061e.:	LS Electric XGB bus coupler, 24 VDC, (2) Ethernet (RJ45) and (1) USB B port(s), EtherNet/IP and Modbus TCP, 100/1000 Mbps. For use with LS Electric XGB series I/O modules.							
<u>XEL-BSSCT</u>	\$06dkk:	LS Electric XGB bus coupler, 24 VDC, (2) Ethernet (RJ45) and (1) USB B port(s), EtherCAT Slave, 100 Mbps. For use with LS Electric XGB series I/O modules.							

Note: See "Smart Link I/O System" on page tLSE-131 for the XTB-40H terminal block and cables. See "XGB PLC Replacement Terminals" on page tLSE-149 for replacement removable terminal blocks.

XGB PLC Replacement Terminals

Part Number	Price	Function	Description	Compatible With
<u>XGB-CON-3PBC</u>	\$6dkp:	LS Bus coupler power connector, 3 pole	LS Electric XGB terminal block, 3-pin screw type, replacement. For use with LS Electric XGB series bus coupler.	XEL-BSSCT XEL-BSSRT
<u>XGB-CON-3PX</u>	\$;5]5u:	LS XEM Processor Power 3 pole , Tab Lock, Assembly Connector & Wire	LS Electric XGB terminal block, 3-pin with cable pigtail, replacement. For use with LS Electric XEM-DxxxHx PLCs.	XEM-DN32H2, XEM-DN32HP, XEM-DP32H2, XEM-DP32HP
<u>XGB-CON-5PX</u>	\$;5]5t:	LS XEM Processor Serial Communication 5 Pole, Screw Lock	LS Electric XGB terminal block, 5-pin spring clamp, replacement. For use with LS Electric XEM-DxxxHx PLCs.	XEM-DN32H2, XEM-DN32HP, XEM-DP32H2, XEM-DP32HP
<u>XGB-CON-8P</u>	\$;5]5v:	LS XGB PLC IO Connector 8 Pole	LS Electric XGB terminal block, 8-pin screw type, replacement. For use with LS Electric XGB series I/O modules.	XBE-DC16A, XBE-DC16B, XBE-TN16A, XBE-TP16A, XBF-AD08A
<u>XGB-CON-9P</u>	\$;5]5x:	LS XGB PLC IO Connector 9 Pole	LS Electric XGB terminal block, 9-pin screw type, replacement. For use with LS Electric XGB series I/O modules.	XBE-RY08B, XBE-RY16A
<u>XGB-CON-10P</u>	\$;5]5y:	LS XGB PLC IO Connector 10 Pole	LS Electric XGB terminal block, 10-pin screw type, replacement. For use with LS Electric XGB series I/O modules.	XBE-DC16A, XBE-DC16B, XBE-TN16A, XBE-TP16A, XBF-AD08A, XBE-AC08A
<u>XGB-CON-11P</u>	\$;5]5q:	LS XGB PLC IO Connector 11 Pole	LS Electric XGB terminal block, 11-pin screw type, replacement. For use with LS Electric XGB series I/O modules.	XBF-AD04A , XBF-AH04A, XBF-DV04A, XBF-DV04C, XBF-DC04A, XBF-DC04C
<u>XGB-CON-15P</u>	\$;5]5s:	LS XGB PLC IO Connector 15 Pole	LS Electric XGB terminal block, 15-pin screw type, replacement. For use with LS Electric XGB series I/O modules.	XBF-AD04C



XGB-CON-3PX



XGB-CON-9P



XGB-CON-15P



XGB-CON-3PBC

Smart Link I/O System

The Smart Link I/O system is a breakout wiring system used for high density I/O modules in the LS Electric XGB PLC series. The system is required for all modules with a 40-pin connection, and consists of a Smart Link cable with an XTB-40H terminal block.

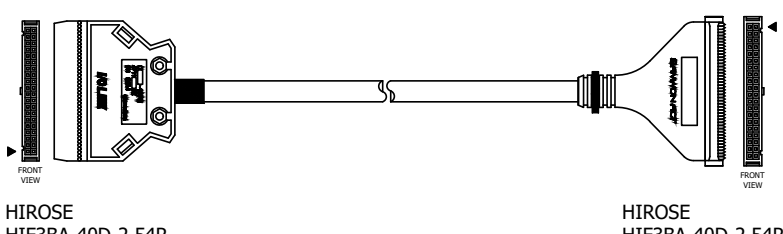
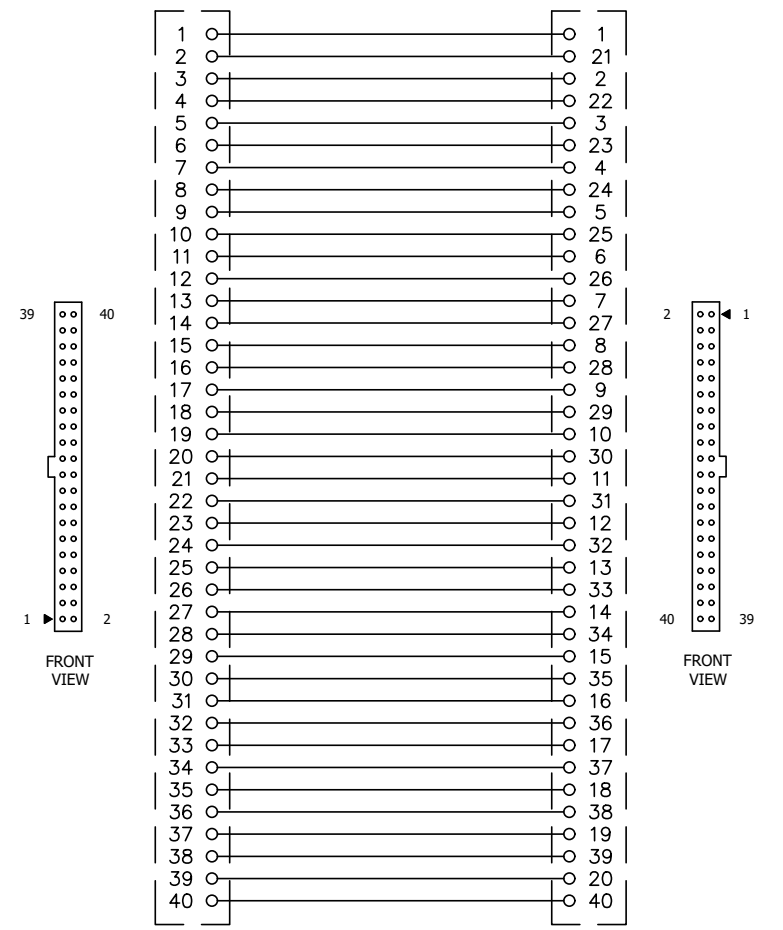
Download module specific XTB-40H Terminal Label Printouts here: [Terminal Printouts](#)



Part Number	Price	Description	Length	Compatible With
<u>XTB-40H</u>	\$;-5]5l:	LS Electric XGB terminal block, 40-pin screw type. For use with LS Electric XGB series high-density modules.	n/a	All LS XGB series PLCs and modules with 40-pin connectors
<u>XTB-40H-LABEL</u>	\$61e_:	AutomationDirect terminal label sheet, printed with terminal names for LS Electric XGB series modules. Package of 8. For use with XTB-40H terminal block.	n/a	
<u>C40HH-05SB-XBI</u>	\$;-5]5i:	LS Electric XGB PLC I/O cable, 1.6ft/0.5m cable length, 40-pin connector to 40-pin connector. For use with LS Electric XGB series high-density modules.	0.5 m	
<u>C40HH-10SB-XBI</u>	\$;-5]5j:	LS Electric XGB PLC I/O cable, 3.2ft/1m cable length, 40-pin connector to 40-pin connector. For use with LS Electric XGB series high-density modules.	1m	
<u>C40HH-15SB-XBI</u>	\$;5]5k:	LS Electric XGB PLC I/O cable, 4.9ft/1.5m cable length, 40-pin connector to 40-pin connector. For use with LS Electric XGB series high-density modules.	1.5 m	
<u>C40HH-20SB-XBI</u>	\$;5]5o:	LS Electric XGB PLC I/O cable, 6.5ft/2m cable length, 40-pin connector to 40-pin connector. For use with LS Electric XGB series high-density modules.	2m	
<u>C40HH-30SB-XBI</u>	\$;5]5p:	LS Electric XGB PLC I/O cable, 9.8ft/3m cable length, 40-pin connector to 40-pin connector. For use with LS Electric XGB series high-density modules.	3m	

XTB-40H Specifications	
Number of Pins	40 pin
Terminal Pitch	7.0 mm
Connector Type	MIL-C-83503 (50P polarity guide: 2EA)
Applicable Wires	AWG22-16 (1.5mm ² /MAX)
Insulation Resistance	100MΩ (500VDC)
Dielectric Strength	500VAC 1 minute
Screw	M3 x 8L
Screw Torque	1.2N•m (12kgf•cm)
Ambient Temperature	-10°C to +50°C (no freezing)
Material	Case Modified PPO
	Protective Cover Polycarbonate
	PCB Epoxy 1.6t

Smart Link I/O System, Terminals and Cable Connections

Module to Cable to Terminal Pinouts		
Module Pins	C40HH-xxSB-XBI	XTB-40H Terminal
B20	 HIROSE HIF3BA-40D-2.54R HIROSE HIF3BA-40D-2.54R	A1
B19		B1
B18		A2
B17		B2
B16		A3
B15		B3
B14		A4
B13		B4
B12		A5
B11		B5
B10		A6
B09		B6
B08		A7
B07		B7
B06		A8
B05		B8
B04		A9
B03		B9
B02		A10
B01		B10
A20	 39 40 1 2 FRONT VIEW 2 1 40 39 FRONT VIEW	A11
A19		B11
A18		A12
A17		B12
A16		A13
A15		B13
A14		A14
A13		B14
A12		A15
A11		B15
A10		A16
A09		B16
A08		A17
A07		B17
A06		A18
A05		B18
A04		A19
A03		B19
A02		A20
A01		B20